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Virtual is so real! Consumers' evaluation of product packaging in virtual reality

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Abstract

Virtual Reality (VR) is shaping all human activities, and with the advent of the metaverse, buyers are going to experience new ways of doing shopping. What would happen if consumers will be asked to assess a product's attribute, i.e., packaging, in a virtual environment, instead of being able to physically hold the product, like in a traditional purchasing process? The aim of this study is to analyze consumers' evaluation of packaged products in immersive VR, manipulating packaging structural and haptic cues, and clarify potential differences with the consumers' responses in the real life. We conducted two focus groups (Study 1), with 16 participants, a mixed design experiment (Study 2), involving 167 consumers, to analyze consumers' attitudes, and a choice-based conjoint analysis (Study 3), with 41 individuals, to study actual choice behavior. The main findings reveal that consumer behavior in VR is consistent with everyday life, except for minor variations. VR proves to be an efficient and rigorous research environment, also suitable for testing sensory cues and non-tangible attributes. Finally, the article suggests managers can effectively use VR for product and packaging development, through a more sustainable process that requires fewer resources and time compared to traditional tests.

KEYWORDS

consumer evaluation, packaging, sensory cues, structural cues, sustainability, virtual reality, willingness to pay a premium price

1 | INTRODUCTION

The relevance of Virtual Reality (VR) in the business context and the academic debate is growing rapidly (PwC, 2019). VR, regarded as a synthetic environment (Loureiro et al., 2019), is considered a technological megatrend progressing the digitization of all areas of human life (Dwivedi et al., 2022; Xi & Hamari, 2021). VR has a major impact on shopping (Martínez-Navarro et al., 2019; PwC, 2019) because it provides consumers with a new experience. VR applications are entering the maturity stage with devices, such as Head Mounted Displays (HMD), leading firms to turn to experiential marketing platforms (van Berlo et al., 2021).

VR marketing literature is only recently advancing (Wedel et al., 2020), lacking consensus among researchers about how consumers consider this technology, particularly what are the peculiarities in consumer behavior (Cowan et al., 2021; Wedel et al., 2020; Xi & Hamari, 2021). Pfeiffer et al. (2020) call for more research that compares behavior in VR versus Real Life (RL). Some recent articles in product-related research have contrasted VR with other experimental conditions—and in some cases with RL—while neglecting product-specific attributes (Hilken et al., 2022a).

Among several product attributes, this study focuses on packaging due to its crucial role in marketing strategic decisions. Packaging is strictly linked to the product, manipulable without changing the product itself, on which consumers can easily focus. However, packaging used in daily consumption is responsible for a large part of waste accumulation (Herbes et al., 2020). The rising attention to sustainability influences consumption behavior and led to more eco-friendly choices among consumers (Resciniti, 2020). Green packaging can represent a response to consumer requests to make more conscious purchases (Nguyen et al., 2020). Thus, diverting attention from this issue can imply underestimating a relevant aspect.

What would happen if consumers were asked to assess packaging in a VR, instead of being able to physically hold the product in their hands, as in a traditional purchasing process? Would they behave consistently as in everyday life? Our main aim is to understand if the evaluation of products in VR leads to similar results as in RL, clarifying potential differences in situations where consumers evaluate packaging in the two conditions. In RL users interact with real elements in the real world, while in VR individuals interact in real-time with digital elements in a completely virtual environment (Loureiro et al., 2019). Building on the cue utilization theory (Olson, 1978), the direct comparison of behavior in the two conditions can provide a better understanding of virtual product evaluation. Multisensory experiences, such as VR, are context-specific (Mishra et al., 2021). A product evaluation (tangibility) can be very different from a tourism experience (intangible service) (Orús et al., 2021).

Consumers rely on several packaging cues to assess its sustainability—for example, structural cues (material), sensory cues, and visual cues (Herbes et al., 2020; Magnier & Crié, 2015). It is reasonable to assume that reading a text or viewing a label can be similar in both VR and RL, while the same cannot be said when it comes to packaging material and, especially, the haptic response, without touching it. Consequently, through three studies, this article compared consumer responses in VR and RL and identified which packaging alternatives lead to higher Perceived Sustainability (PS) and Willingness to pay a Premium Price (WTPP).

2 | THEORETICAL BACKGROUND

2.1 | VR and product research

VR creates a strong sense of presence in a digitally fabricated environment, different from other media (Kang et al., 2020; Pala et al., 2021). VR allows isolating individuals from the outside world, immersing them in a complete and innovative synthetic environment (Hoyer et al., 2020), that may or may not mimic the real world (Loureiro et al., 2019). Users can interact in real-time and move physically within the virtual environment (Hilken et al., 2022b; Hoyer et al., 2020). VR can allow rapid prototyping with more shortly and less expensively consumer evaluation (Harz et al., 2021). Several effects of marketing interventions—such as food packaging design or advertising—can be tested via VR (Schnack et al., 2020). Thus, VR represents a useful approach in packaging prototyping, elicits a searching process similar to RL, and delivers realistic cues for food and beverage products (Huang et al., 2021).

Previous studies have addressed—in some cases with mixed results—consumer behavior in VR, also comparing it with other conditions (e.g., Cowan et al., 2021; Kang et al., 2020; Naderi et al., 2020; Pizzi et al., 2020). Four relevant themes for this study seem to emerge in the literature: (a) prominence of VR over other conditions; (b) purchase intention in VR; (c) shopping experience in VR; and d), similarities between VR and other conditions (see Table 1).

In a study conducted with durable goods, VR generates more vividness and sense of presence, compared to other experimental conditions (Harz et al., 2021), and consumers behave more consistently for purchase intention, information search and preferences, compared to real product tests. Participants in VR are less price-sensitive and more willing to choose a bigger variety of products (Meißner et al., 2020) when compared to low-immersive solutions, but the same does not happen for choice satisfaction. Cowan et al. (2021) show that 360-VR elicits more favorable evaluations than low-presence media, while 360-VR in-store is less favorable. With low product category knowledge, VR enhances consumer responses toward the brand, differently from high product knowledge. The effect is attenuated by haptic information.

Purchase intention can vary depending on VR configuration, and the virtual store can generate more positive responses than the physical one, higher brand recall and purchase intention (Martínez-Navarro et al., 2019). Interactivity and visual-spatial cues enhance perceived informativeness and playfulness, but graphics quality was found to be more critical for 2D display than for 3D VR (Kang et al., 2020). Viewing products in VR also elicits lower purchase intentions compared to online 3D images.

In the VR supermarket setting, the exclusion of external variables and confounding factors allows for a more immersive, interactive, and realistic experience. This condition consent to analyze the actual behavior and overcome the complexities of a field study (Bernritter et al., 2021; Naderi et al., 2020). Pizzi et al. (2020) show that the high level of presence triggered by the VR store can lead to a more positive shopping experience, higher retailer value perception, patronage intention and word-of-mouth. Simulating real packaging can influence the shopping experience and enhance brands in affecting product attributes and information (Loureiro et al., 2019). Similar effects can be found in the duration of the shopping experience, numbers, and types of products chosen comparing physical and VR-based stores, but VR supermarket leads to increased value perception of shopping experience and higher store satisfaction (Pizzi et al., 2019).

Consumers show shopping patterns similar to real-world behavior during a multi-category shopping trip in a VR store (Schnack et al., 2020). Siegrist et al. (2019) demonstrate that the evaluation and selection of packaged food in VR was comparable to the one in RL, while differences are still observed across the two conditions. Naderi et al. (2020) find minor differences between VR and a lower immersive solution.

TABLE 1 Overview of selected articles on VR and product research

Themes	Authors	Research methodology	Sample involved	Comparison	Product	Main findings
Prominence of VR	Cowan et al. (2021)	Field experiment, online experiment	Consumers	360-VR, picture, video, real products, website video	Champagne, automobiles	360-VR generates higher favorable evaluations than low presence conditions. 360-VR in-store results in less favorable responses. Product knowledge and haptic information influence consumers' attitudes.
	Harz et al. (2021)	Field study, laboratory experiment	Consumers	VR HMD, online VR, real products	Gardening tools	VR enhances consistency between information search, preferences, and purchasing behavior, eliciting more vividness and sense of presence.
	Meißner et al. (2020)	Laboratory experiment	Students	VR HMD, desktop screen, real products	Muesli	Consumers in VR are less price-sensitive and more willing to choose a bigger variety of products. Choice satisfaction does not increase.
Purchase intention in VR	Kang et al. (2020)	Online experiment, laboratory experiment	Consumers	Picture, video desktop, website 3D video, Oculus Rift CV1 HMD	Office furniture	Products in VR generate lower purchase intention than ones shown on the website in 3D picture. Interactivity, visual-spatial cues, and graphics quality enhance playfulness and informativeness.
	Martínez-Navarro et al. (2019)	Laboratory and field experiment	Students, consumers	Desktop screen, power-wall, HTC Vive HMD, physical supermarket	Grocery store (beverage area)	VR leads to higher brand recall and purchase intention. The latter can vary according to VR configuration.
Shopping experience in VR	Pizzi et al. (2020)	Online experiment	Consumers	Video in VR-based store, video in physical store	Grocery store	VR store leads to a higher shopping experience, value perception, WOM and patronage intention.
	Pizzi et al. (2019)	Quasi-experiment	Consumers	HTC Vive HMD, physical store	Industrial confectionery	VR generates a similar effect in shopping experience duration, type and number of products chosen compared to the physical store, but higher value perception of shopping experience and store satisfaction.
Similarities between VR and other conditions	Naderi et al. (2020)	Laboratory experiment	Students	Ultra-HD TV, Oculus Rift CV1 HMD	Digital camera	Minor differences were found between the higher and the lower immersive solution.
	Schnack et al. (2020)	Laboratory experiment	Consumers	HTC Vive HMD	Food and drinks	Consumers show similar shopping patterns in VR compared to real-world behavior reported in the literature.
	Siegrist et al. (2019)	Laboratory experiment	Students	VR HMD, real shelf, real products	Cereals	No relevant differences were found in product evaluation and selection.
	The present research	Focus group, laboratory experiment, choice-based conjoint analysis	Consumers	Oculus Quest 2 HMD, real products	Milk package	Perceived Sustainability and Willingness to pay a Premium Price, across two groups of packaging manipulation, show similar results among VR and RL.

Haptic cues can be relevant in brand evaluation, even for not physical products (Cowan et al., 2021). VR can simulate real products allowing consumers to haptically explore products (Alzayat & Lee, 2021). The "vicarious haptic effect"—the observation of a hand in physical contact with a product in digital environments—is strongest for people who become highly stimulated by an immersive VR experience (Luangrath et al. (2022). However, the haptic response should be also studied in the case of individuals interacting directly in VR. Notably, in Luangrath et al.'s (2022) research, participants had control over where to look, but the system did not allow for virtual hands to mimic the actual movements of the participant's own hands.

According to the cue utilization theory (Olson, 1978), products/packaging present multiple cues, which consumers use to assess the products. These cues are acquired and processed to determine purchasing decisions (Hwang & Kim, 2022). Since VR can replicate RL elements and deliver realistic cues, it would seem reasonable to achieve similar results across the two realities. In a few cases, extant literature shows some mixed outcomes, but in general, these results focus on holistic aspects of the product or experience. Taken the above, two hypotheses are formulated:

H1: Consumers show a similar level of packaging Perceived Sustainability in Virtual Reality and Real Life.

H2: Consumers show a similar level of Willingness to pay a Premium Price in Virtual Reality and Real Life.

2.2 | Packaging and sustainability

Packaging is the first element to which consumers are exposed when choosing a product at the shelf, influencing the purchase process (Huang et al., 2022). Research is recently focusing on the role of packaging finishes in enhancing product attributes (Chen, 2021).

Sustainable packaging, green packaging or eco-friendly packaging refer to the same concept in the academic literature (Nguyen et al., 2020). Packaging can be intended as a series of design elements of different natures, which can serve as cues for consumers (Steenis et al., 2017). Consumers rely on different types of sustainability cues to evaluate packaging (Herbes et al., 2020; Magnier & Crié, 2015): (a) structural (packaging material, size, and shape); (b) visual cues (images, labels, colors); (c) information on environmental impact; (d) sensory cues (haptic response). Consumers' perception of packaging eco-friendliness relies on three dimensions, namely packaging material (the most prominent one), manufacturing technology and market appeal (Nguyen et al., 2020). Consumers' perception is mainly influenced by packaging material and structure (Herbes et al., 2020; Steenis et al., 2017). Glass and bioplastic are perceived as the most sustainable solution, followed by laminated cartons (Boesen et al., 2019), liquid carton, plastic pouch, mixed pouch, dry carton sachet and can (Steenis et al., 2017). Paper is deemed to be an eco-friendly alternative, whereas plastic is regarded as the least environmentally friendly solution (Nguyen et al., 2020). Based on the above, two hypotheses are formulated:

H1a: Glass packaging is perceived as more sustainable than carton packaging, which in turn is perceived as more sustainable than plastic packaging in Virtual Reality

H1b: Glass packaging is perceived as more sustainable than carton packaging, which in turn is perceived as more sustainable than plastic in Real Life

Sensory cues of natural materials are associated with eco-friendliness (Karana, 2012; Karana & Nijkamp, 2014). An opaque, rough, non-reflective material is related to naturalness, differently from a smooth, reflective, glossy one. Magnier and Schoormans (2017) demonstrate how packaging made of a fiber-based material has a higher PS than a plastic one. Based on the above, two hypotheses are formulated:

H1c: Rough packaging is perceived as more sustainable than normal packaging, which in turn is perceived as more sustainable than smooth packaging in Virtual Reality

H1d: Rough packaging is perceived as more sustainable than normal packaging, which in turn is perceived as more sustainable than smooth packaging in Real Life

Even though consumers' actual behavior is often inconsistent with their attitudes, they often show a WTPP for eco-friendly products (Vecchio & Annunziata, 2015). A packaging perceived to be sustainable leads consumers to be willing to pay more for the product, because of the positive association triggered by the packaging. Nguyen et al. (2020) point out that consumers show WTPP if they are satisfied with the characteristics of the market's appeal. Singh and Pandey (2018) analyze the WTPP for green packaging as a proxy of actual behavior. Moser (2015) finds that willingness to pay is the strongest predictor of green purchasing behavior. Thus, it is expected that packaging deemed more sustainable leads to a higher WTPP than one considered less sustainable. Based on the above, the following hypotheses are formulated:

H2a: Consumers are willing to pay a premium price for glass packaging over carton packaging, and for carton packaging over plastic packaging in Virtual Reality

H2b: Consumers are willing to pay a premium price for glass packaging over carton packaging, and for carton packaging over plastic packaging in Real Life

H2c: Consumers are willing to pay a premium price for rough packaging over normal packaging, and for normal packaging over smooth packaging in Virtual Reality

H2d: Consumers are willing to pay a premium price for rough packaging over normal packaging, and for normal packaging over smooth packaging in Real Life

3 | OVERVIEW OF THE STUDIES

3.1 | Materials and methods

We conducted three studies, each one with complementary objectives and methodologies (see Table 2).

Study 1 verified the designed packaging manipulations and collected preliminary feedback on the research hypotheses. Thus, two focus groups were performed to understand the interaction between the participants, using a qualitative approach.

Study 2 was a mixed between-within-subjects design experiment. The between-subjects design allows for comparing consumer behavior in VR and RL and prevents the assessment from being influenced by previous experiences. The within-subjects design was chosen to mimic a realistic shopping experience (Aagerup et al., 2019): during the purchase process, consumers generally see several products, one after the other. This study is a 2 (VR vs. RL) × 5 (packaging manipulations) experimental design, and it can be ideally divided into two studies since they are two groups of manipulations that have in common the control group, namely the baseline carton packaging. From this point on, we will refer to Study 2A for a 2 (VR vs. RL) × 3 (structural cues) between-within-subjects experiment, and to Study 2B for a 2 (VR vs. RL) × 3 (haptic cues) between-within-subjects experiment.

Laboratory experiments are characterized by high internal validity, but they can present generalizability issues, due to a lower level of external validity (Viglia et al., 2021). To address this limitation and measure actual choice behavior, a choice-based conjoint analysis (CBCA) in VR was conducted as Study 3. CBCA mirrors actual buying situations: choosing a preferred product among others is a simple and natural task, a realistic approach due to the involvement of a simulated purchase, and it is preferable to a ranking or rating (Allenby et al., 2005; Haaijer & Wedel, 2007; Meyerding & Merz, 2018). Consumers are exposed to a set of concrete alternatives and requested to think in trade-off patterns stating their preferences as in a real-life decision-making situation (Meyerding & Merz, 2018). Specific characteristics of a product can be applied directly in the CBCA. Study 3A refers to structural manipulations and Study 3B to haptics.

3.2 | Stimuli development

The product category was food and beverage (as in Aagerup et al., 2019; Gosselt et al., 2019; Marozzo et al., 2020). The milk pack can be realistically tested since it is: (a) a consumer good easily accessible and sold in any kind of store; (b) a low-involvement product, habitually bought, and the purchasing decision process is quite simple (Peukert et al., 2019); (c) available in a wide range of packaging options with different environmental impacts (Steenis et al., 2017); and (d) most of the consumers have purchased milk either for personal consumption or for others.

New mock-ups of a fictitious product were created rather than using a product already available in the market (Spack et al., 2012). This helped to prevent prior knowledge of the product from influencing participants, and precisely manipulating the packages. By looking at milk packaging commonly available in the Italian market (where the research was conducted), a first packaging mock-up was created, in digital format, with the collaboration of two expert designers, to enhance the realism of the study (Magnier & Schoormans, 2015). First, a blue carton baseline packaging was realized. Blue is a common color for milk packages in the Italian market, and carton is the classic material for liquid food packages, commonly available in stores. Two simple texts have been provided, namely "*latte intero*" ("*whole milk*") and "*1L*" (1 litre) to better contextualize the contents of the package. An elaborated or small text could be difficult to read in VR (Siegrist et al., 2019). An on-package text in Italian was chosen similar to previous studies conducted in non-English speaking countries (e.g., Huang et al., 2022; Meißner et al., 2020). The design was minimal, to avoid excessive stimuli, and the visual recalled a drop of milk.

From this version, two groups of manipulations were performed (see Supporting Information: Appendix A). On-package verbal information and visual elements were kept constant across the designs. For the first group, the packaging material was manipulated. Common structural designs were chosen, namely a glass bottle and a plastic bottle. The second group of manipulations concerned the tactile response to the material. Starting from the baseline packaging, the composition of the cardboard was manipulated to obtain two different variations: a rough, non-reflective, opaque, warm version,

TABLE 2 Overview of the studies

Study	Purpose	Method		Experimental design	Packaging manipulations	Sample
1	Verify the validity and effectiveness of packaging manipulations, obtain preliminary feedback on the research hypotheses.	Focus group			Structural and haptic cues	*N* = 16
2	Compare consumers' evaluation of product packaging in VR and RL, measuring PS and WTPP.	Between-within-subjects laboratory experiment	2A	2 × 3	Structural cues	*N* = 167
			2B	2 × 3	Haptic cues	
3	Analyze actual choice behavior in VR, focusing on the WTPP for different packaging alternatives.	Choice-based conjoint analysis	3A		Structural cues	*N* = 41
			3B		Haptic cues	

Abbreviations: PS, Perceived Sustainability; RL, Real Life; VR, Virtual Reality; WTPP, Willingness to pay a Premium Price.

and a smooth, reflective, glossy, cold one (Chen, 2021; Karana, 2012; Karana & Nijkamp, 2014). A total of five different packaging alternatives from the two manipulation groups were obtained (the baseline packaging is common to the two groups).

After Study 1, minor changes in the stimuli were made (Steenis et al., 2017), as explained in Section 4. The final version was then shared with two partner companies, one operating in cardboard packaging production (for the glass and the plastic bottle, we purchased white labeled third-party products), and the other specialized in VR applications. A total of five physical versions of the milk carton and five perfectly identical versions in VR were used. For Study 2 and Study 3, a virtual room characterized by a minimal appearance and neutral colors was developed to ensure a neutral scenario extraneous to the participants. At the center, there was a small table on which the packaging was shown. Similarly, in the physical environment, the experiment was conducted in a neutral environment room, with a table in the center on which, similar to VR, the packaging was presented.

4 | STUDY 1

Two focus groups were conducted in Study 1, to check if: (a) the packaging manipulations were perceived as planned and were relevant to individuals (Gosselt et al., 2019); (b) a realistic stimulus appearance was achieved, with mock-ups designed as similar to the products commonly available in the market; (c) there were spaces for improvement in clarity or errors in the designed stimuli; and, to (d) have preliminary feedback on the research hypotheses.

The two focus groups were held online in April 2021, conducted by the same researchers (Millward, 2012). Eight consumers took part in each focus group, for a total of 16 participants, identified by convenience sampling. Details are shown in Table 3. After agreeing to participate and having signed the informed consent, the individuals were convened for one of the two online sessions.

At the beginning of the meeting, a brief introduction has been read to the participants, addressing the session modalities, the purpose, and the topic of the meeting (a debate on packaging and sustainability). Participants were also informed that the audio would be recorded to facilitate the content analysis. The two groups of manipulations were then presented, one at a time. The participants were asked to indicate which was the most eco-friendly solution among the alternatives and to explain their choice. The data generated by the focus groups were transcribed, integrated with notes, and then analyzed by the researchers.

The participants perceived the manipulations as planned, they were sufficiently distinct, and the stimuli were relevant to them. Minor changes were made to improve the quality of the stimuli. The shape of the cardboard packaging was slightly modified and made more pleasant, the visual was re-designed as more harmonious, and a pastel color pattern was chosen to make the mock-ups as realistic as possible. Finally, the preliminary results confirmed the direction of the hypotheses.

TABLE 3 Demographics of Study 1

		Focus group 1	Focus group 2
Gender	Male	4 (50%)	4 (50%)
	Female	4 (50%)	4 (50%)
Age	Range	21-51	21-59
	Mean	34.63	35.87
Education level	Less than high school	- (-)	1 (12.5%)
	High school diploma	4 (50%)	3 (37.5%)
	Specialized/ vocational/ technical training	- (-)	- (-)
	Bachelor's degree	1 (12,5%)	2 (25%)
	Master's degree	2 (25%)	1 (12.5%)
	Doctoral Degree	1 (12.5%)	1 (12.5%)
Occupation	Employed	3 (37.5%)	2 (25%)
	Self-employed/ Freelance	1 (12.5%)	2 (25%)
	Homemaker	1 (12.5%)	1 (12.5%)
	Student	2 (25%)	2 (25%)
	Other	1 (12.5%)	1 (12.5%)

5 | STUDY 2

5.1 | Pilot test and manipulation check

A pilot test was conducted in June 2021. Eighteen consumers were involved and then excluded from the main experiment. Half of the participants were assigned randomly to the VR condition (55.56% females, age range = 18–34) and half to the RL condition (55.56% males, age range = 18–34). The pilot test aimed to identify potential issues with research protocol, technical issues, timing, manipulations, measurements, and questionnaire flow (Naderi et al., 2020). Based on feedback, the procedure worked as expected.

For each packaging alternative in VR and RL, an additional question was included—not present in the main study questionnaire—for the purpose of manipulation check. For the structural manipulations group, the subjects were asked to indicate, among a list of given alternatives, what material was the packaging made of. In both conditions, all participants indicated the material as intended by the design, and thus confirmed the effectiveness.

For the haptic manipulation group, individuals were asked to evaluate the packaging on a 4-item 7-point semantic differential scale, adapted from Karana (2012). "This milk pack is": 1 = matte/7 = shiny; 1 = not reflective/7 = reflective; 1 = unrefined/7 = polished; 1 = rough/7 = smooth. The results were different for the two experimental conditions. For the group in RL, results of the One-way ANOVA showed a significant effect of haptic manipulation ($M_{baseline} = 4.19$; $M_{rough} = 1.75$; $M_{smooth} = 5.64$; $F\ (2,\ 24) = 30.229$;

$p = 0.000$). However, the VR group results of the One-way ANOVA did not show a significant effect ($M_{baseline} = 4.5$; $M_{rough} = 4.08$; $M_{smooth} = 4.72$; $F\ (2,\ 24) = 0.564$; $p = 0.576$). Based on the last feedback, some minor adjustments were made in the virtual product version, by making the differences among haptic manipulations more vivid and noticeable.

A new manipulation check was conducted during the main experiment, only for the haptic cues group in the VR condition. Twenty random participants were asked to rate the packaging, as done previously. In this case, result of the One-way ANOVA showed a significant effect of haptic manipulation ($M_{baseline} = 4.64$; $M_{rough} = 3.13$; $M_{smooth} = 5.36$; $F\ (2,\ 57) = 17.081$; $p = 0.000$).

5.2 | Participants and procedure

Italian consumers (167) took part in the experiment: 84 were randomly assigned to the VR condition and 83 randomly to the RL condition (see Table 4). Participants were identified by convenience sampling and compensated by drawing five Amazon gift cards of the value of 30 euros each (Magnier & Schoormans, 2015). The laboratory experiments were held in June 2021 in a central-southern Italian city.

TABLE 4 Demographics of Study 2

		VR	RL
Gender	Male	43 (51.2%)	44 (53.0%)
	Female	41 (48.8%)	39 (47%)
Age	18–24	33 (39.3%)	34 (41.0%)
	25–34	36 (42.9%)	36 (36.4%)
	35–44	2 (2.4%)	2 (2.4%)
	45–54	6 (7.1%)	4 (4.8%)
	55–64	7 (8.3%)	7 (8.4%)
Education level	Less than high school	2 (2.4%)	3 (3.6%)
	High school diploma	34 (40.5%)	34 (41.0%)
	Specialized/vocational/ technical training	1 (1.2%)	1 (1.2%)
	Bachelor's degree	18 (21.4%)	21 (25.3%)
	Master's degree	21 (25.0%)	22 (26.5%)
	Doctoral Degree	8 (9.5%)	2 (2.4%)
Occupation	Employed	19 (22.6%)	17 (20.5%)
	Self-employed/freelance	8 (9.5%)	13 (15.7%)
	Unemployed—looking for work	2 (2.4%)	6 (7.2%)
	Unemployed—not looking for work	1 (1.2%)	1 (1.2%)
	Homemaker	1 (1.2%)	2 (2.4%)
	Student	41 (48.8%)	38 (45.8%)
	Retired	- (-)	1 (1.2%)
	Other	12 (14.3%)	5 (6.0%)

Abbreviations: RL, Real Life; VR, Virtual Reality.

After the individuals gave their consent to participate in the study, they received a brief introduction, being informed that the purpose of the study was to analyze and evaluate some milk packages not yet available in the market. Participants were encouraged to examine products for how long they desired (Kang et al., 2020). They were required to complete the tasks in VR or in RL. RL participants viewed one package at a time, in a random order, and then completed a self-report questionnaire—after every package—to capture the dependent variables.

The Oculus Quest 2 HMD was used for the VR condition. A Leap Motion Controller was mounted on the HMD for hand tracking: without the use of controllers and being able to interact with their hands, we ensured the participants' freedom of movement and tracking with a near-zero latency accuracy. The ability to directly control the virtual hands addresses the limitations of previous literature on haptic in marketing (Luangrath et al., 2022). The notebook connected to the HMD was equipped with ray tracing technology, which allows to realistically simulate the light behavior. Thus, two windows were provided in the virtual room as dynamic light sources (see Supporting Information: Appendix B).

For the VR, a training session was also conducted before running the real experiment (everyone wore the HMD and interacted with a cubic object not included in the main experiment (see Supporting Information: Appendix A)) so that participants become familiar with the experimental task (Meißner et al., 2020; Siegrist et al., 2019). After interacting with each packaging, shown in a random order, the user filled out a self-report questionnaire, used to capture the dependent variables (PS and WTPP). At the end of the task, all participants answered a short questionnaire about demographic data.

PS was adapted from Gershoff and Frels (2015) and measured on a 2-item 7-point scale (1 = strongly disagree, 7 = strongly agree): "This milk pack is environmentally friendly"; "A person who cares about the environment would be likely to buy this milk pack". WTPP was based on Chaudhuri and Holbrook (2001) and measured on a 2-item 7-point scale (1 = strongly disagree, 7 = strongly agree): "I am ready to pay a higher price for this milk pack"; "Buying this milk pack seems smart to me even if it cost more."

5.3 | Results

For both studies, a mixed ANOVA was conducted in IBM SPSS Statistic 28.0, which means repeated measures within-subjects ANOVA (i.e., packaging manipulations) with a between-subjects factor (i.e., VR vs. RL) (see Supporting Information: Appendix C).

5.3.1 | Study 2A

The plastic bottle was perceived the less sustainable solution in both treatments (VR: $M_{VRplastic} = 2.9$, $SD_{VRplastic} = 1.68$; RL: $M_{RLplastic} = 2.52$,

$SD_{RLplastic}$ = 1.53). The glass bottle was perceived as more sustainable alternative in both treatments (VR: $M_{VRglass}$ = 5.1, $SD_{VRglass}$ = 1.79; RL: $M_{RLglass}$ = 5.83, $SD_{RLglass}$ = 1.47) followed by the baseline carton packaging (VR: $M_{VRbaseline}$ = 4.6, $SD_{VRbaseline}$ = 1.63; RL: $M_{RLbaseline}$ = 4.68, $SD_{RLbaseline}$ = 1.62). Thus, H1a and H1b are supported. The Test of Equality of Covariance Matrices is more than 0.05 (0.194). Levene's Test of Equality of Error Variances shows p-values more than 0.05 (0.272, 0.607, 0.052). Mauchly's Test of Sphericity shows a p-value more than 0.05 (0.344), so the assumption of homogeneity of variance was not violated. Looking at the Multivariate Tests, we have evidence of a significant main effect, since the p-values are less than 0.05. The Tests of Within-Subjects Contrasts show a significant linear effect since the p-value is less than 0.05 ($p < 0.001$). The Between-Subjects Effect was found to be not significant (F [1,165] = 0.701, $p = 0.404$). There was not a significant difference in between-groups for the plastic bottle and the baseline manipulation, since the p values are more than 0.05 (0.128, 0.753), while a significant difference was found between the two conditions for the glass bottle ($p = 0.004$). Thus, H1 is partially supported for structural manipulation. A significant difference in the within-subjects groups was found for all the manipulations, except for the baseline carton and the glass bottle in VR condition ($p = 0.073$).

The glass bottle elicits the highest WTPP across both treatments (VR: $M_{VRglass}$ = 4.87, $SD_{VRglass}$ = 1.73; RL: $M_{RLglass}$ = 5.32, $SD_{RLglass}$ = 1.65), followed by baseline carton packaging (VR: $M_{VRbaseline}$ = 3.74, $SD_{VRbaseline}$ = 1.58; RL: $M_{RLbaseline}$ = 3.95, $SD_{RLbaseline}$ = 1.6) and plastic bottle (VR: $M_{VRplastic}$ = 2.57, $SD_{VRplastic}$ = 1.56; RL: $M_{RLplastic}$ = 2.51, $SD_{RLplastic}$ = 1.45). Thus, H2a and H2b are supported. The Test of Equality of Covariance Matrices is more than 0.05 (0.229). Levene's Test of Equality of Error Variances shows p-values more than 0.05 (0.657, 0.775, 0.607). Mauchly's Test of Sphericity shows a p-value more than 0.05 (0.908), so the assumption of homogeneity of variance was not violated. Looking at the Multivariate Tests, we have evidence of a significant main effect, since the p values are less than 0.05. The Tests of Within-Subjects Contrasts show a significant linear effect since p-values are less than 0.05 ($p < 0.001$). The Between-Subjects Effect was found to be not significant (F [1,165] = 1.399, $p = 0.239$). There were not a significant difference in between-groups means, since the p-values are more than 0.05 (0.799, 0.386, 0.088). Thus, H2 is supported for structural manipulation. A significant difference in the within-subjects groups was found for all the manipulations since the p-values are less than 0.05.

5.3.2 | Study 2B

The smooth packaging was perceived the less sustainable solution, especially in the RL condition (VR: $M_{VRsmooth}$ = 4.35, $SD_{VRsmooth}$ = 1.78; RL: $M_{RLsmooth}$ = 3.78, $SD_{RLsmooth}$ = 1.81). The rough pack was perceived as the most sustainable alternative across both treatments (VR: $M_{VRrough}$ = 5.24, $SD_{VRrough}$ = 1.42; RL: $M_{RLrough}$ = 5.42, $SD_{RLrough}$ = 1.59), followed by the baseline carton packaging (VR: $M_{VRbaseline}$ = 4.6, $SD_{VRbaseline}$ = 1.63; RL: $M_{RLbaseline}$ = 4.68, $SD_{RLbaseline}$ = 1.62). Thus, H1c and H1d are supported. The Test of Equality of Covariance Matrices is more than 0.05 (0.322). Levene's Test of Equality of Error Variances shows p values more than 0.05 (0.171, 0.607, 0.839). Mauchly's Test of Sphericity shows a p value less than 0.05 ($p > 0.001$), so the assumption of homogeneity of variance was violated. Interpreting the Greenhouse-Geisser corrected analysis ($p = <0.001$) and the Huynh-Feldt correction ($p = 0.004$) in the Tests of Within-Subjects Effects, we have evidence of a significant main effect, because the p values are less than 0.05. The Tests of Within-Subjects Contrasts show a significant linear effect since p-values are less than 0.05 ($p < 0.001$). The Between-Subjects Effect was found to be not significant (F (1,165) = 0.234, $p = 0.629$). There was not a significant difference in between-groups for the rough package and the baseline manipulation, since the p values are more than 0.05 (0.461, 0.753), while a significant difference was found between the two conditions for the smooth packaging ($p = 0.043$). Thus, H1 is partially supported for haptic manipulation. A significant difference in the within-subjects groups was found for all the manipulations, except for the baseline carton and the smooth one in the VR condition ($p = 0.341$).

The rough packaging elicits the highest WTPP across both treatments (VR: $M_{VRrough}$ = 4.38, $SD_{VRrough}$ = 1.53; RL: $M_{RLrough}$ = 4.5, $SD_{RLrough}$ = 1.65), followed by the baseline carton in RL condition (RL: $M_{RLbaseline}$ = 3.95, $SD_{RLbaseline}$ = 1.6; RL: $M_{RLsmooth}$ = 3.33, $SD_{RLsmooth}$ = 1.63) and the smooth packaging in VR condition (VR: $M_{VRsmooth}$ = 3.77, $SD_{VRsmooth}$ = 1.73; VR: $M_{VRbaseline}$ = 3.74, $SD_{VRbaseline}$ = 1.58). Thus, H2c is partially supported and H2d is supported. The Test of Equality of Covariance Matrices is more than 0.05 (0.639). Levene's Test of Equality of Error Variances shows p-values more than 0.05 (0.481, 0.775, 0.552). Mauchly's Test of Sphericity shows a p-value less than 0.05 ($p < 0.001$), so the assumption of homogeneity of variance was violated. Interpreting the Greenhouse–Geisser corrected analysis ($p < 0.001$) and the Huynh-Feldt correction ($p = 0.007$) in the Tests of Within-Subjects Effects, we have evidence of a significant main effect, because the p values are less than 0.05. The Tests of Within-Subjects Contrasts show a significant linear effect since p-values are less than 0.05 ($p < 0.001$). The Between-Subjects Effect was found to be not significant (F [1,165] = 0.032, $p = 0.859$). There were not a significant difference in between-groups means, since all the p values are more than 0.05 (0.630, 0.386, 0.086). Thus, H2 is supported for haptic manipulation. A significant difference in the within-subjects groups was found for all the manipulations, since the p-values are less than 0.05, except for the baseline carton and the smooth one in the VR condition ($p = 1.000$), as in the previous case.

5.4 | Discussion

Three main aspects deserve to be discussed. First, the glass bottle was perceived as the most sustainable solution, followed by the baseline carton pack and the plastic bottle, in both treatments (Boesen et al., 2019; Herbes et al., 2020; Steenis et al., 2017). Similar

results are shown for WTPP in Study 2A. No statistically significant difference was found in all the between-subjects scores, except for the glass bottle PS, higher in RL than in VR. No statistical differences emerged for WTPP across conditions. Study 2A findings confirm that, except for minor variations, consumers similarly assess packaging structural cues in VR and RL. The rough packaging is the most sustainable solution, followed by the baseline carton and the smooth packaging in Study 2B, confirming and extending previous literature (Karana, 2012; Karana & Nijkamp, 2014), in both treatments. Indeed, there is almost no evidence of a statistically significant difference in all the between-subjects scores, except for the smooth packaging PS, which scores higher in VR than in RL. Although the preferences present a partially different order in the two conditions, no statistical differences emerged for WTPP across conditions. Even if with minor variations, it could be assumed that consumers similarly assess packaging haptic cues in VR and RL. Taken together, these results extend previous literature on similarities between VR and RL (Naderi et al., 2020; Schnack et al., 2020; Siegrist et al., 2019). In sum, across Study 2A and Study 2B, the variables analyzed show statistically significant differences in only two cases out of 12 pairwise comparisons, while maintaining consistency with the overall result.

Second, consumers tend to make less polarized judgments in VR than in RL, that is, the differential between scores is reduced. Although it is always indicated as the less preferred alternative in Study 2A the plastic bottle scores higher PS in VR than in RL. This could probably be due to the perception of the material itself and the weight of the packaging, an element that cannot be replicated in VR. Similarly, in Study 2B the smooth packaging PS scores higher in VR than in RL. The reflective and glossy effect of the smooth packaging could be stronger in the RL. Physically touching the real smooth packaging triggers a more negative PS evaluation than in VR. This phenomenon is consequently reflected in the WTPP.

Consistently, looking at the results of the two studies simultaneously, when comparing the maximum and minimum values of PS and WTPP, the difference between the two extremes is always lower in VR. This means that regardless of the structural or haptic cues, the scores assigned by the participants are closer to each other in VR than in RL (see Supporting Information: Appendix C).

Finally, packaging PS across the two studies shows results with higher deviations within the alternatives for the structural cues, while the variations within the manipulations of haptic cues are smaller. We argue that individuals rely more on the packaging material (Herbes et al., 2020; Steenis et al., 2017) than on the haptic response when it comes to sustainability, regardless of the experimental condition.

6 | STUDY 3

Study 3 aims to analyze the actual choice behavior in VR through objective data. The focus is on WTPP since the hypotheses about PS have been supported and are in line with previous literature. It also addresses the partially different order of WTPP of haptic manipulations. Thus, this allows closing of the "attitude-behaviour gap" (Viglia et al., 2021), since the gap between positive intentions towards sustainable practices and the less frequent adoption seems still relevant (Olson, 2022). CBCA is applied for evaluating consumer value and for inferring willingness to pay (Sadik-Rozsnyai & Bertrandias, 2019). Packaging has been previously used for CBCA studies (Jensen et al., 2021; Meißner et al., 2020; Peukert et al., 2019). A realistic packaging presentation enhances credibility and elicits a real purchase scenario (Meyerding & Merz, 2018).

Two attributes were considered: packaging and price. The levels of the packaging were the same as in Study 2A and Study 2B. Three levels of prices have been identified. For numerical attributes—such as price—actual values can be used in the design (Haaijer & Wedel, 2007). Allenby et al. (2005) suggest the selection of ranges and attribute levels approximately at the level of the market to be simulated and design the task in a simple way. The average price of one litre of milk in Italy is 1.50€, based on a report by the Italian public economic institution ISMEA (2002). Taking the average price as a starting point, 0.10€ were added for each level, resulting in prices of 1.60, 1.70, and 1.80€.

The choice set design and the data analysis has been carried out with JMP Pro 14 (SAS Institute Inc). For Study 3A, the software produced a choice set combining plastic bottle, baseline carton and glass bottle with the three identified price levels (1.60, 1.70, 1.80€). Similarly, for Study 3B, the software produced a choice set combining rough carton, baseline carton and smooth carton with the three identified price levels (1.60, 1.70, 1.80€). Two profiles per choice and 10 pairs of profiles were produced for each choice set. A no-choice option ("none of the packaging") was included to increase realism and avoid forced, biased decisions (Niemand et al., 2019).

6.1 | Participants and procedure

A total of 41 Italian consumers—using convenience sampling—took part in the CBCA experiment, held in May 2022 in a central-southern Italian city (see Table 5). The minimum sample size to be chosen considered the requirement for conjoint analysis is at least 30 participants (Bendixen et al., 2004).

After the participants gave their consent to participate in the study, they received a brief introduction and were informed about the purpose of the study—to analyze and evaluate some milk packages not yet available in the market. Before viewing the choice sets, researchers reminded participants to consider their budget, to reduce the potential for hypothetical bias (Jensen et al., 2021). The VR setting, the HMD, the training task, and the materials were the same as in Study 2.

Participants were then shown one pair of packages at a time and asked to choose one or none of them. At the end of the task, they answered a short questionnaire about demographic data. Participants were also asked about previous experiences in VR: for 75.6% it was the first experience ever.

TABLE 5 Demographics of Study 3

Gender	Male	19 (46.3%)
	Female	22 (53.7%)
Age	18–24	24 (58.5%)
	25–34	7 (17.1%)
	35–44	2 (4.9%)
	45–54	6 (14.6%)
	55–64	2 (4.9%)
Education level	Less than high school	1 (2.4%)
	High school diploma	22 (53.7%)
	Specialized/vocational/ technical training	1 (2.4%)
	Bachelor's degree	2 (4.9%)
	Master's degree	13 (31.7%)
	Doctoral degree	2 (4.9%)
Occupation	Employed	6 (14.6%)
	Self-employed/freelance	6 (14.6%)
	Student	23 (56.1%)
	Working student/part-time worker	2 (4.88%)
	Other	4 (9.76%)
Previous experiences in VR	First experience in VR	31 (75.6%)
	1–2	6 (14.6%)
	3–4	3 (7.3%)
	5–6	1 (2.4%)

Abbreviation: VR, Virtual Reality.

6.2 | Results

6.2.1 | Study 3A

The Effect Summary indicates that the attribute Structural (LogWorth: 13.873; $p = 0.000$) and the attribute Price (LogWorth: 6.431; $p = 0.000$) are significant. The Likelihood Ratio Test outlines that the attribute Structural (χ^2: 63.888, $p < 0.001$) and the attribute Price (χ^2: 29.618, $p < 0.001$) are significant.

In VR consumers showed a WTPP as assumed, confirming Study 2A findings: H2a is supported. At the price of 1.60€, the utility for the glass bottle was the highest (1.029), followed by the carton packaging (0.389) and lastly by the plastic bottle (−0.209). At the price of 1.70€, the utility for the glass bottle was the highest (0.714), followed by the carton packaging (0.074) and lastly by the plastic bottle (−0.524). At the price of 1.80€, the same pattern is presented: the glass bottle (0.135) is followed by the carton packaging (−0.505) and lastly by the plastic bottle (−1.103). A similar pattern can be identified in the Effect Marginals results (see Supporting Information: Appendix C).

6.2.2 | Study 3B

The Effect Summary indicates that the attribute Haptic (LogWorth: 1.761; $p = 0.017$) and the attribute Price (LogWorth: 27.842; $p = 0.000$) are significant. The Likelihood Ratio Test outlines that the attribute Haptic (χ^2: 8.108, $p = 0.017$) and the attribute Price (χ^2: 128.219, $p < 0.001$) are significant.

In VR consumers presented WTPP as assumed, addressing Study 2B findings: H2c is supported. At the price of 1.60€, the utility for the rough packaging was the highest (1.148), followed by the baseline packaging (1.002) and lastly by the smooth packaging (0.652). At the price of 1.70€, the utility for the rough packaging was the highest (0.136), followed by the baseline packaging (−0.010) and lastly by the smooth packaging (−0.360). At the price of 1.80€, the same pattern is presented: the glass bottle (−0.643) is followed by the carton packaging (−0.788) and lastly by the plastic bottle (−1.138). A similar pattern can be identified in the Effect Marginals results (see Supporting Information: Appendix C).

6.3 | Discussion

Three relevant insights emerge from the study. First, at each incremental price level, the glass bottle is the solution that generates the highest utility, followed by the carton packaging, while the plastic bottle generates the lowest utility. Similarly, rough packaging is preferred over regular, while smooth packaging generates the smallest utility. These results reinforce Study 2 findings, through actual choice behavior data.

Second, looking at the contribution of each attribute, the attribute Structural is more relevant than Price, in Study 3A, while conversely, Price is more relevant than Haptic in Study 3B. Consumers seem to rely more on the packaging material than on the haptic cues when it comes to packaging choice, consistent with findings in Study 2.

Finally, in Study 3A, the glass bottle utility is always positive at each price level, albeit with decreasing values, while the utility of the plastic bottle is always negative. In Study 3B, however, the rough packaging utility is positive only for the first two price levels, while the utility of the smooth packaging is positive only for the first price level.

7 | CONCLUSIONS

7.1 | Theoretical contributions

This study contributes to the literature on VR and consumer behavior in four ways. First, this study compares behavior in VR versus RL. Results show that the attitude in VR is comparable and consistent with that in RL: by analyzing PS and WTPP the findings show that the scores were almost always similar, except for a few minor variations, in line with Naderi et al. (2020) and Siegrist et al. (2019). Thus,

consumer attitudes do not vary in VR compared to RL. When it comes to actual behavior analysis, the results confirmed the hypothesized phenomenon, showing that the evaluation of products in VR is consistent with RL.

Second, grounded on the cue utilization theory (Olson, 1978) and moving from the literature on sustainable packaging, individuals' response to the different packaging manipulations has been analyzed, between VR and RL. In contrast with Martínez-Navarro et al. (2019), for which the high cognitive engagement level in VR may discourage users from focusing on specific stimuli, it has been demonstrated that the stimuli were properly perceived and well recognized and that the consumers' evaluations corresponded to the same obtained in RL, to some minor differences aside. The findings confirm Huang et al. (2021), according to whom VR delivers realistic product cues. The same attitudinal output was achieved even if the participants did not physically touch the product and handle the different packaging. One of the most interesting implications is related to the sensory side of the evaluation and haptic cues (Alzayat & Lee, 2021; Cowan et al., 2021; Loureiro et al., 2021). This expands previous literature, according to which traditional studio tests with physical prototypes may be preferable for those attributes, as simulating haptics in VR is difficult (Harz et al., 2021).

Third, this study deepens knowledge of immersive technologies (e.g., VR) as research tools (Hilken et al., 2022b). VR can be identified as an environment in which consumers behave as in their everyday life. VR also allows for conducting efficient and rigorous research in the consumer behavior domain, since it is possible to extend traditional experimentations' boundaries, and even offset the limitation of a field study (Bernritter et al., 2021). Product testing in VR can be a valid alternative to traditional methods, but with several additional benefits due to greater ecological validity, higher control by researchers, reduction of spatial, temporal, and economic limits in conducting experiments. Thus, VR can be seen not only as a shopping environment but also as a setting to conduct marketing research in the consumer behavior domain (Wedel et al., 2020).

Finally, this study provides evidence about packaging sustainability and consumers' attitudes, addressing structural and haptic cues evaluation. Consumers tend to rely more on the packaging material than on the haptic response in assessing sustainability, and similar results emerge for the WTPP across the studies. CBCA findings contrast with some of the extant literature (Aagerup et al., 2019), showing how consumers are now willing to pay more for sustainable packaging. This can be a consequence of the growing concern for global warming and environmental pollution (D'Arco et al., 2022).

7.2 | Managerial implications

This study provides three main recommendations for practitioners. First, it is possible to conduct packaging tests and product evaluations in VR, including sensory cues and non-tangible aspects, such as sustainability. Product and packaging design, prototyping and consumers' evaluation will be disruptively affected by VR. VR can have an impact even before products reach the actual purchasing process. Traditional product and pack tests present a series of critical issues, mainly found in the costs and times of realization of the mock-ups, and in the impossibility of making changes or variations to the models in a short time. VR can make these tests more agile, leading to several advantages: to perform tests without the use of physical mock-ups; the possibility and immediacy of carrying out or presenting variations of the same model; conduct tests anywhere, anytime; overcome the perishable nature of the products; allowing more data and information from the test. VR can also enable creative teams and potential users to identify any problems early in the process before changes become too costly to make.

Second, practitioners should not resist to use VR as a testing and prototyping tool, since it leads to results similar to RL, even when it comes to understanding actual choice behavior and forecasting the most suitable product solutions for the market. VR leads to more sustainable and eco-friendly processes, requiring less resources and time compared to traditional testing, and simplify the packaging value chain.

Third, practitioners should consider that consumers rely more on the material of the packaging and less on haptic cues. Packaging material manipulations in VR are effective in impacting purchasing choices.

Finally, VR should not merely replicate everyday life in a digital world, as this would imply translating the limitations and complexities of the real world into the digital one, which does not suffer from such barriers. Rather than substituting RL, VR should be considered as an integration of the consumer experience: the purchase of a virtual product could then represent a relevant step in a process that continues in the real world and enriches it.

7.3 | Limitations and directions for future research

The limitations of this study can also provide directions for future research. The first concerns the generalizability of the results. The samples involved consist of Italian consumers, identified by convenience sampling, and largely under the age of 34. Future research should involve older consumers and different nationality samples. Laboratory experiments present high internal validity, but external validity may be reduced (Viglia et al., 2021). Conducting a CBCA attempted to address this limitation. However, due to the number of participants involved in this last study, future research may consider a larger sample.

Second, in Study 2 a few minor differences emerged between VR and RL. Future studies can investigate the presence of moderating factors that impact the packaging evaluation among the two experimental conditions.

Third, this study employed only HMD. Future studies could integrate the experimentation using tools that track movements of the body or collect biometric measurements (Baldo et al., 2022) to understand consumer behavior more in-depth and take full advantage of the use of autonomous technologies in conducting experiments.

Four, future studies can analyze consumer responses in VR for different types of products, (e.g., fast-moving consumer goods or high-involvement products) and other packaging characteristics (e.g., shape or weight). Those kinds of factors cannot (yet) be appropriately rendered in VR when grasping products and can come into play in packaging overall assessment.

Finally, as VR research becomes more consolidated, upcoming studies can explore new dimensions of marketing, shopping experience and retail, going beyond the constructs and theories that characterize traditional environments, bringing the focus on aspects not yet investigated.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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SUPPORTING INFORMATION

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